OPTICAL TOMOGRAPHY SYSTEM FOR BUBBLES DETECTION IN LIQUID MEDIUM

JULIZA BINTI JAMALUDIN

A project report submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Engineering (Electrical – Mechatronics and Automatic Control)

Faculty of Electrical Engineering
Universiti Teknologi Malaysia

JANUARY 2013

Dedicated, in thankful appreciation for support, encouragement and understandings to my beloved mother, Noriah Binti Hj. Maamor, my husband Jemmy @ Mohd Jemmy Bin Mohd Rohani, siblings and in memory of my late father Haji Jamaludin Bin Zakaria.

ACKNOWLEDGEMENT

First and. foremost, I would like to express my heartily gratitude to my supervisor, Prof. Dr. Ruzairi Bin Haji Abdul Rahim for the guidance and enthusiasm given throughout the progress of this projectMy appreciation also goes to my husband and my family who has been so tolerant and supports me all these years. Thanks for their encouragement, love and emotional supports that they had given to me.I would also like to thank our PROTOM members for their co-operations, guidance and helps in this project. Nevertheless, my great appreciation dedicated to my friends and those whom involved directly or indirectly with this project.

ABSTRACT

Process tomography is widely used in industrial, medical diagnostic, chemical engineering and many more because this method is suitable for multiphase flow imaging and measurement system. Optical tomography is one of the most popular methods that had been used in tomography area because it has high resolution compare to other methods of tomography system. The main goal of this project is to build a new design of optical tomography system for bubbles detector using couple charge device linear sensor and laser diode. In this report it describes the objectives, problems encountered, and scopes of the project. Detail's discussion about research, methodology and result for this project also carried out in this report. This project present a new orientation of sensor and detectors compared to the previous research in a way to obtain more precise and concise of image reconstruction. The characteristics and the advantages of sensor and detectors that had been used in optical tomography system for bubbles detection also discussed in detail based on the literature review.

ABSTRAK

Tomografi adalah satu kaedah mendapatkan imej sesuatu bahagian dan ia sangat banyak digunakan dalam dunia industri, perubatan, kimia, dan dalam kaedah sains yang lain. Tomografi ini sesuai dalam melakukan pengukuran dan pengambilan imej bendalir yang mengalir dalam bentuk pelbagai fasa. Tomografi optik sangat sesuai digunakan dalam pengkajian imej kerana tomografi optik mempunyai resolusi yang tinggi berbanding dengan kaedah tomografi yang lain.Tujuan utama projek ini adalah untuk mereka dan membina sistem tomografi optik bagi pengesan kehadiran buih-buih udara di dalam aliran bendalir yang berbeza-beza. Sistem ini menggunakan 'Couple Charge Device Linear Sensor' dan diod laser. Di dalam tesis ini juga menerangkan tentang objektif, penemuan masalah, skop projek, metodologi dan keputusan akhir. Penerangan yang lebih mendalam dalam thesis ini akan turut dibincangkan. Projek ini juga akan memperkenalkan penyusunan bahagian sensor secara selari d imana sensor yang disusun secara selari dapat membantu dalam mendapatkan imej lebih menyeluruh. Ciri-ciri serta kelebihan penggunaan sensor ini turut dibincangkan.